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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/674,771

09/30/2003

Mark Visokay

TI-35943

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11/15/2005

TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX. 75265

EXAMINER

KENNEDY, JENNIFER M

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 11/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary

Application No.

10/674,771

Applicant(s)

VISOKAY ET AL.

Examiner

Jennifer M. Kennedy

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 29-33, 35 and 37-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 29-33, 35, 37-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 29, 2005 has been entered.

Response to Amendment

In view of Applicants' arguments and the amendment to the claims, some of the the rejections of claims 29 and 35 under 35 U.S.C. 112 second paragraph, as being indefinite, are withdrawn. However, the first 112 rejection set forth in the final rejection has not be overcome by the amendment and is maintained as follows.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 29 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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In line 4 of claim 29, Applicants recite " a second metal silicide". In line 8 of claim 29, Applicants recite " a second metal silicide". It is unclear in the claims whether the second metal silicide referred to on line 8 is the same metal silicide referred to on line 4. The examiner suggests replacing the second instance of "a second metal silicide" with "said second metal silicide".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 35 and 37-41 are rejected under 35 U.S.C. 102(e) as being anticipated by Doris et al. (U.S. Patent No. 6,908,850).

In re claim 35, Doris et al. disclose a transistor gate structure, comprising
a gate dielectric (200) formed above a semiconductor body (100);
a first metal silicide (900) on and in direct physical contact with the gate dielectric, the first metal silicide doped with substantially single polarity impurities (see column 6, lines 35-45) and having a first metal component; and
a second metal silicide having a metal component different from the first metal (1300) component, above the first metal silicide.

In re claim 37, Doris et al. teach the device wherein a silicon layer is between the first and second metal silicides (1000, see column 7, lines 15-25).

In re claims 38 and 39, Doris et al. disclose the device wherein the first metal silicide comprises a refractory metal, and wherein the refractory metal is one of molybdenum, tungsten, tantalum, and titanium (see column 5, lines 15-50).

In re claims 40-41, disclose the device wherein the first metal silicide comprises nickel (see column 6, lines 45-67).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 29-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sayama et al. (U.S. Patent No. 5,744,845) in view of Amos et al. (U.S. Patent Appl. 2005/0064690).

In re claim 29, Sayama et al. disclose a semiconductor device comprising:
an NMOS transistor gate structure (3, 36, 15a, 5a, and 7b), the NMOS gate structure comprising a gate dielectric (3) above a semiconductor body (1), an n-doped first metal silicide structure (36, 15a) having a first metal component on the gate dielectric, and a second metal silicide (5a) having a metal component different from the first metal component different composition above the n-doped first metal silicide; and

a PMOS transistor gate structure (3, 37, 15b, 5b, and 7a), the PMOS gate structure comprising a gate dielectric (3) above a semiconductor body (1), a p-doped first metal silicide structure (37, 15b) having the first metal component on the gate dielectric, and a second metal silicide having a metal component different from the first metal component above the p-doped first metal silicide.

Sayama et al. does not disclose the device wherein the metal silicide structure has the first metal silicide structure is formed on and in direct physical contact with the gate dielectric. Amos et al. disclose the device wherein the first metal silicide is on and in direct physical contact with the gate dielectric (see [0052] and Figure 3A), thus forming a layered stack of silicide/polysilicon/silicide. It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the first metal silicide in direct physical contact with the gate dielectric in order to prevent the typical polysilicon resistance related issues (see Amos et al. [0004]) and because the stack construction of Amos et al. facilitates cleaning and minimizes cross contamination.

In re claims 30 and 31, Sayama et al. and Amos et al. disclose the device wherein the first metal silicide comprises a refractory metal, and wherein the refractory metal is one of molybdenum, tungsten, tantalum, and titanium (see Sayama et al. column 7, lines 55-60, and/or Amos et al. [0052] and [0051] discloses the gate metals).

In re claim 32, the combined Sayama et al. and Amos et al. disclose the device wherein the second metal silicide comprises nickel (see Amos et al. [0052]). It would have been obvious to one of ordinary skill in the art at the time the invention was made

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to utilize nickel in the second metal silicide because as Amos et al. teach nickel is the preferred material, and because as is known in the art nickel offers particular advantages over other metals in silicide technology, including that of the tungsten, such as a reduced thermal budget

In re claim 33, Sayama et al. does not disclose the device comprising a silicon layer between the first and second metal silicides in the NMOS and PMOS gate structure. Amos et al. disclose the device a CMOS device with a layered stack having a silicon layer between the first and second metal silicides. It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the stack of the NMOS and PMOS of Sayama et al. with the first metal silicide in direct physical contact with the gate dielectric and a silicon layer between the first and second metal silicides in order to prevent the typical polysilicon resistance related issues (see Amos et al. [0004]) and because the stack construction of Amos et al. facilitates cleaning and minimizes cross contamination.

Response to Arguments

Applicant's arguments with respect to claims 29-33, 35, and 37-41 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Bertrand et al. (U.S. Patent No. 6,432,817) disclose Ni offers

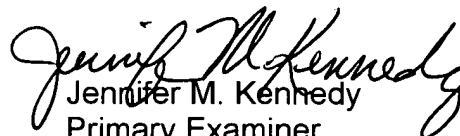
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particular advantages over other metals in silicide technology, including that of the tungsten, such as a reduced thermal budget (see column 1, lines 57-60).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Kennedy whose telephone number is (571) 272-1672. The examiner can normally be reached on Mon.-Fri. 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Jennifer M. Kennedy
Primary Examiner
Art Unit 2812

jmk